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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,066

06/27/2007

Atsushi Asada

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01/05/2009

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EXAMINER

SUITTE, BRYANT P

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,066	<b>Applicant(s)</b> ASADA ET AL.	
	<b>Examiner</b> BRYANT SUITTE	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11 September 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/26/02, 11/29/06, 8/30/06</u> .                             | 6) <input type="checkbox"/> Other: _____                          |

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**REINFORCING MATERIAL FOR PROTON CONDUCTIVE MEMBRANE, AND  
PROTON CONDUCTIVE MEMBRANCE USING THE SAME AND FUEL CELL**

Examiner: Suitte

10/591,066

December 17, 2008

**DETAILED ACTION**

1. The request for reconsideration filed on September 11, 2008 was received.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on July 21, 2008.

***Claim Rejections - 35 USC § 103***

3. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (US 2004/0062970) in view of Ino et al. (US 2006/0068270) on claims 1, 7, 8, 10, 11, 12 and 13 are withdrawn because Applicant's remarks were persuasive.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 7, 8, 10, 11, 12 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Nomura et al. (WO 03/041091) (see corresponding US 2004/0062970 for translation) as evidenced by Ferreira et al. (US 2002/0192562).

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Regarding claims 1, 12, and 13, Nomura discloses a proton-conducting membrane comprising a three-dimensional silicon-oxygen structure. It is resistant to heat, swells and contracts to a limited extent with changed humidity. The reinforcing agent can be fibrous, fibril or porous membrane form (I). The reinforcing agent can comprise fluorine resin represented by polytetrafluoroethylene, cyclic polyolefin resin, high-molecular-weight polyolefin and inorganic materials, e.g., glass as the materials resistant to these severe environments. See paragraph 177 and 178. The fibrous materials can comprise a diameter of 3 to 20  $\mu\text{m}$  and a length of 10 mm or more. See paragraph 199. Nomura discloses the utilization of glass that is alkali resistant and acid-resistant composed of  $\text{SiO}_2$  and  $\text{B}_2\text{O}_3$ . See paragraphs 182-184. It is well recognized in the art that C-glass is alkali-resistant fibrous glass as evidenced by Ferreira et al. See paragraph 24.

Regarding claim 2, Nomura discloses The present invention also provides a method for producing the proton-conducting membrane, comprising steps of preparing a mixture containing an organic/inorganic hybrid (binder), cross-linkable compound (C) and compound (D), the former having 2 or more cross-linkable silyl groups and carbon atoms each being bonded to the silyl group via the covalent bond and the latter having a cross-linkable silyl group and acid group. See abstract.

Regarding claim 7, Nomura discloses the weave density is 10 to 50  $\text{g/m}^2$ . See paragraph 209.

Regarding claim 8, Nomura discloses the thickness of the square weave is essentially determined by the above specifications, 20 to 100  $\mu\text{m}$ . See paragraph 208.

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Regarding claim 10, Nomura discloses a silanol group (coupling agent) that reacts with the organic/inorganic hybrid structure (binder) (A) and acid-containing structure (B). See paragraph 180.

Regarding claim 11, Nomura discloses a quantity of the solution loaded on to the membrane was set at 50 g/m<sup>2</sup>. See paragraph 436.

6. The rejection under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (US 2004/0062970) and Ino (US 2006/0068270) on claims 3, 4, 5, 6, and 9, as applied to claims 1, 2, 7, 8, 12 and 13 above, and in further view of Fongalland et al. (WO 00/24075) is withdrawn because applicant's arguments were persuasive.

7. Claims 3, 4, 5, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (WO 03/041091) (see corresponding US 2004/0062970 for translation), as applied to claims 1, 2, 7, 8, 12 and 13 above, and further in view of Fongalland et al. (WO 00/24075).

Regarding claims 3, 4, and 5, Nomura discloses a proton-conducting membrane comprising a three-dimensional silicon-oxygen structure as recited in the above paragraph. However, Nomura does not disclose a weight percent of an inorganic binder.

Fongalland discloses a binder, i.e. colloidal silica, for use in preparing the substrate in the form of a dilute aqueous dispersion, in 1-30 weight percent, preferably 10 weight percent in aqueous solution. See column 4 lines 5-30. Therefore, it would

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have been obvious to utilize the binder in the formation of the proton conducting membrane of Nomura because Fongalland teaches the binder is applied during the process for forming the matrix of fibers.

Regarding claim 6, Nomura discloses a proton-conducting membrane comprising a three-dimensional silicon-oxygen structure as recited in the above paragraph. However, Nomura does not disclose a weight percent of a fibrous binder to the glass fibers.

Fongalland discloses the binders are mixed before application. The binder can comprise colloidal silica: PTFE (fibrous binder) mixed binder. The ratio of silica to polymer may be in the range of from 95:5% to 5: 95%, and is preferably in the range of 90:10% to 10:90%, such as 70:30% to 30:70%, e.g. 50:50%. The mixed binder for use in the substrate is in the form of a dilute aqueous dispersion, such as a 1-30 weight percent, preferably a 5-20 weight percent e.g. about 10 wt % solids in the aqueous solution. See column 4 lines 9-21. It can be concluded that the fibrous binder are composed within the 1-30 weight percent thereby the fibrous binder can be 1-30 weight percent of the glass fibers composition. Therefore it would have been obvious to one of ordinary skill in the art to utilize the mixed binder comprising the fibrous binder with the chemical composition of the proton conducting membrane of Nomura because Fongalland teaches applied during the process for forming the matrix of fibers.

Regarding claim 9, Nomura discloses a proton-conducting membrane comprising a three-dimensional silicon-oxygen structure as recited in the above paragraph.

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However, Nomura does not disclose a weight percent of a porosity of the non-woven fabric.

Fongalland teaches a porous substrate can have 50 or at least 75% comprising individual pore sizes being greater than 1  $\mu\text{m}$  in at least one direction. See column 5 lines 10-12. Therefore it would have been obvious to one of ordinary skill in the art to utilize the porous substrate with the proton conducting membrane of Nomura because Fongalland teaches the substrate comprising the porosity is suitable for use in the preparation of a composite membrane for use in a fuel cell. See column 5 lines 13-15.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYANT SUITTE whose telephone number is (571)270-3961. The examiner can normally be reached on Mon-Fri 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BRYANT SUITTE/  
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795